

CLAIMS

1. A laser oscillation element, comprising:

a first cholesteric liquid crystal layer containing cholesteric liquid crystals;

5 a second cholesteric liquid crystal layer containing cholesteric liquid crystals facing said first cholesteric liquid crystal layer;

and a defect layer containing a dye which emits fluorescence upon optical excitation disposed between said first cholesteric liquid crystal layer and said second cholesteric liquid crystal layer, wherein:

10 the selective reflection wavelength band in said cholesteric liquid crystals and the fluorescence emission band of the fluorescence emitted from said dye overlap with each other in at least a part of the wavelength range;

the helical winding directions of the cholesteric liquid crystals in said 15 first cholesteric liquid crystal layer and said second cholesteric liquid crystal layer are identical; and

the transition moments of said dye are parallel to the surfaces of said first cholesteric liquid crystal layer and said second cholesteric liquid crystal layer.

20 2. The laser oscillation element according to claim 1, wherein said defect layer is composed of an anisotropic medium.

3. A laser oscillation element, comprising:

a first cholesteric liquid crystal layer containing cholesteric liquid crystals;

25 a second cholesteric liquid crystal layer containing cholesteric liquid crystals facing said first cholesteric liquid crystal layer; and

a defect layer composed of an anisotropic medium disposed between said first cholesteric liquid crystal layer and said second cholesteric liquid crystal layer, wherein:

5 the helical winding directions of the cholesteric liquid crystals in said first cholesteric liquid crystal layer and said second cholesteric liquid crystal layer are identical;

a dye which emits fluorescence upon optical excitation is contained in at least one of said first cholesteric liquid crystal layer, said defect layer and said second cholesteric liquid crystal layer; and

10 the selective reflection wavelength band in said first cholesteric liquid crystal layer and said second cholesteric liquid crystal layer, and the fluorescence emission band of the fluorescence emitted from said dye, overlap in at least part of the wavelength range.

4. The laser oscillation element according to any of claims 1 to 3, wherein said defect layer contains liquid crystals.

15 5. The laser oscillation element according to claim 4, wherein said liquid crystals are nematic liquid crystals.

6. The laser oscillation element according to claim 5, wherein the transition moments of said dye and the directors of said nematic liquid crystals are aligned parallel to each other.

20 7. The laser oscillation element according to claim 5 or 6, wherein said dye is contained in the same layer as the nematic liquid crystals.

8. The laser oscillation element according to any of claims 1 to 7, wherein said cholesteric liquid crystals have a wavelength at an emission peak in an emission band of the fluorescence emitted from said dye in the selective reflection wavelength band.

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9. The laser oscillation element according to claim 4 or 5, wherein said dye is an organic dye.

5 10. The laser oscillation element according to any of claims 1 to 9, wherein said first cholesteric liquid crystal layer and said second cholesteric liquid crystal layer are aligned such that the directors of the cholesteric liquid crystals in the surface on the defect layer side of said first cholesteric liquid crystal layer, and the directors of the cholesteric liquid crystals in the surface on the defect layer side of said second cholesteric liquid crystal layer, are parallel to each other.